

Part 1

General

Standards for Digital Raster Graphics

Standards for Digital Raster Graphics
Part 1: General

CONTENTS

	Page
1. General	1-1
1.1 Definitions	1-1
1.2 Objectives	1-1
1.3 Product Description	1-2
1.4 THE USGS DRG Process Description	1-4

Standards for Digital Raster Graphics
Part 1: General

LIST OF PAGES

A complete and current copy of part 1 of the Standards for Digital Raster Graphics consists of the pages (and most recent creation or revision dates) listed below.

<u>Page</u>	<u>Date</u>
1-ii	4/96
1-iii	4/96
1-1	4/96
1-2	4/96
1-3	4/96
1-4	4/96
1-5	4/96

Standards for Digital Raster Graphics
Part 1: General

1. GENERAL

1.1 DEFINITION

The term "digital raster graphic" (DRG) is used throughout this document to refer to a georeferenced, rectified raster image of a scanned U.S. Geological Survey (USGS) topographic or planimetric map. The DRG is a product of the USGS.

1.2 OBJECTIVES

The USGS is the lead Federal agency for the collection and distribution of base cartographic data. This standard contains information about the collection, processing, and quality control of DRG data for use in NMD mapping operations.

The USGS intends to use DRGs in data collection, revision, and quality control processes on other digital base cartographic data. For example, the DRG could be used as a backdrop to check the registration of other digital products. In addition, the USGS intends to make the data available to the public by placing the data in the public domain.

The USGS identified opportunities in the public and private sectors to scan and produce raster image files of USGS topographic maps. Data meeting DRG specifications are produced under cooperative agreements between the USGS and private industry and other Federal, State, and local agencies.

The USGS recognizes that some agencies and producers have existing data or plan to produce data that meet or approximate DRG specifications. The USGS intends to take advantage of the availability of these DRG-like products. Cooperative agreements allow the USGS to offer some remittance for the rights to these data. These cooperative agreements, including the Innovative

Standards for Digital Raster Graphics
Part 1: General

Partnership Program, are contingent on product inspection and approval by the USGS. Product uniformity, production expediency, and quality control considerations will determine whether these data will be of use to the USGS.

1.3 PRODUCT DESCRIPTION

DRGs retain the geometric and visual qualities of the source maps, except: (1) DRGs are georeferenced to Universal Transverse Mercator (UTM) ground coordinates and may exhibit distortions in the collar, inset, and overedge areas, and (2) the colors of the DRG can differ slightly from the original printed map.

DRGs characteristics include:

- Their sources are printed maps, color composites, or any other reasonably stable map material.
- Their areal extent may be the entire printed source extent including the map collar, legend, and any overedge or insets. Pertinent source and map information contained in the collar and legend may be unobtainable if the raster graphic is cropped at the neatlines.
- Scanning and output resolutions may vary. Major factors in determining scanning resolution are the product's intended use, scanner capability, and the quality and detail of the source map. File size or the desire to create a workable file size can be a determining factor for output resolution.
- DRGs and comparable products are generally cast and georeferenced on common, widely used projections and coordinate systems. The DRG is cast on the UTM projection and coordinate system, while many raster products created by State

Standards for Digital Raster Graphics
Part 1: General

and local agencies employ their respective State plane coordinate system. Georeferencing allows the user the ability to fit other digital data to the DRG to perform any number of geospatial applications.

- DRGs will retain the datum of the source map.
- DRGs and comparable products will duplicate the horizontal accuracy of its source. Accuracy measurements or a description of how the image was accuracy tested should accompany the data.
- DRGs and other raster products use a color palette to maintain color consistency across images within a given map series. This allows for uniform and visually consistent images throughout a series for the purpose of mosaicking, feature identification, and multiple image viewing.
- DRGs conform to tagged image file formats (TIFF).
- Metadata, data about the image, accompany the product. Metadata provide identification, georeferencing, accuracy, and source lineage data about the image. The DRG is accompanied by an Federal Geographic Data Committee (FGDC) compliant metadata file.

At the USGS, DRGs serve a variety of purposes: from use as backgrounds for other data in a GIS to a source for collecting or revising USGS base cartographic data. The DRG shows potential as a tool for validating and assessing other non-USGS digital data. The DRG can be easily formatted and combined with digital orthophoto quadrangle (DOQ), digital elevation model (DEM), and digital line graph (DLG) data, or combinations of these data can create several

Standards for Digital Raster Graphics
Part 1: General

"hybrid" products, each with its own unique applications. DRG prototypes have been used as "browse images" on in-house data management systems and can serve similarly in production systems and sales data bases. Hard-copy output of the DRG is also being considered as a means to meet the demands for maps that are out of stock. Although a DRG can be made from any USGS map, the program is oriented toward the production of DRGs from 1:24,000-, 1:25,000-, 1:63,360-, 1:100,000-and 1:250,000-scale USGS topographic maps.

1.4 THE USGS DRG PROCESS DESCRIPTION

The production procedures, instrumentation, hardware, and software used in the collection of standard DRG products vary depending on systems used at the contractor, cooperator, or USGS production sites. Because the majority of DRG data sets are acquired through government contract, the following describes the general processes used in the production of standard DRG data sets.

- A paper map is scanned on a high-resolution scanner.
- Screens are removed (descreening, see section 2.1) and colors quantized to reduce the number of colors in the raw scan file.
- The raw scan file is transformed and georeferenced using UTM coordinates.
- The output file is reduced in size via resampling to 250 dots-per-inch (dpi), converted to a TIFF 6.0 format, and compressed (no data loss due to compression).
- Prior to archiving, the DRG undergoes a series of quality assurance checks.

Standards for Digital Raster Graphics
Part 1: General

A more detailed explanation of the processes used in the construction of a DRG may be found in Data Quality Information Section of the Metadata Template (Appendix 2-A) under the 2.5.2.1 Process Description element.